

**Fig. 2**

```

graph TD
    1[1. Any UI design may be inappropriate when a user's context changes]
    2[2. How can a computing system choose between UI designs?]
    3[3. How can a computing system generate a UI at run time?]
    4[4. What UI does this task need?]
    5[5. How can an application be created for an arbitrary UI design?]
    6[6. How much and what is the quality of the attention that a user has for a computing system?]
    7[7. What is the intended use for a particular UI design?]
    8[8. How can new hardware devices be used by computing system generated UI designs?]
    9[9. From the user's perspective, what is currently the optimal UI? (What are the user's needs?)]
    10[10. What is the optimal UI?]
    11[11. What UI do the I/O devices need?]

    1 --> 2
    2 --> 3
    2 --> 4
    2 --> 7
    3 --> 8
    4 --> 10
    5 --> 3
    6 --> 9
    7 --> 10
    9 --> 10
    10 --> 11
    11 --> 3
  
```

The flowchart illustrates the design process for a user interface, showing the relationship between various design questions and their outcomes. The questions are numbered 1 through 11, and the flow is as follows:

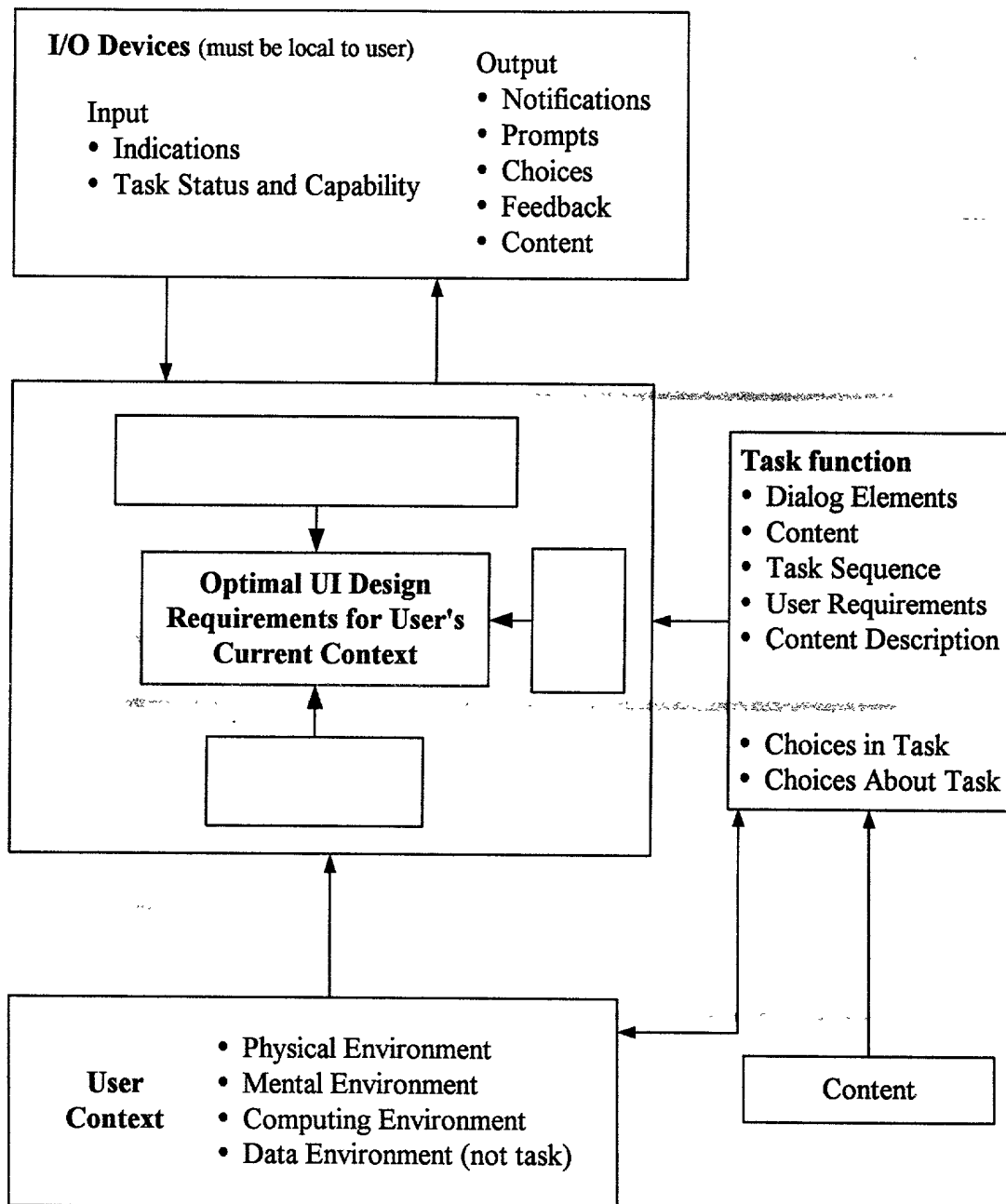
- 1** Any UI design may be inappropriate when a user's context changes
- 2** How can a computing system choose between UI designs?
- 3** How can a computing system generate a UI at run time?
- 4** What UI does this task need?
- 5** How can an application be created for an arbitrary UI design?
- 6** How much and what is the quality of the attention that a user has for a computing system?
- 7** What is the intended use for a particular UI design?
- 8** How can new hardware devices be used by computing system generated UI designs?
- 9** From the user's perspective, what is currently the optimal UI? (What are the user's needs?)
- 10** What is the optimal UI?
- 11** What UI do the I/O devices need?

The flow of the process is indicated by arrows:

- 1 points to 2.
- 2 points to 3, 4, 7, and 8.
- 3 points to 5 and 8.
- 4 points to 10.
- 5 points to 3.
- 6 points to 9.
- 7 points to 10.
- 9 points to 10.
- 10 points to 11.
- 11 points to 3.

**Fig. 3**

## Optimal UI Requirements



**Fig. 4**

Design time

Run time

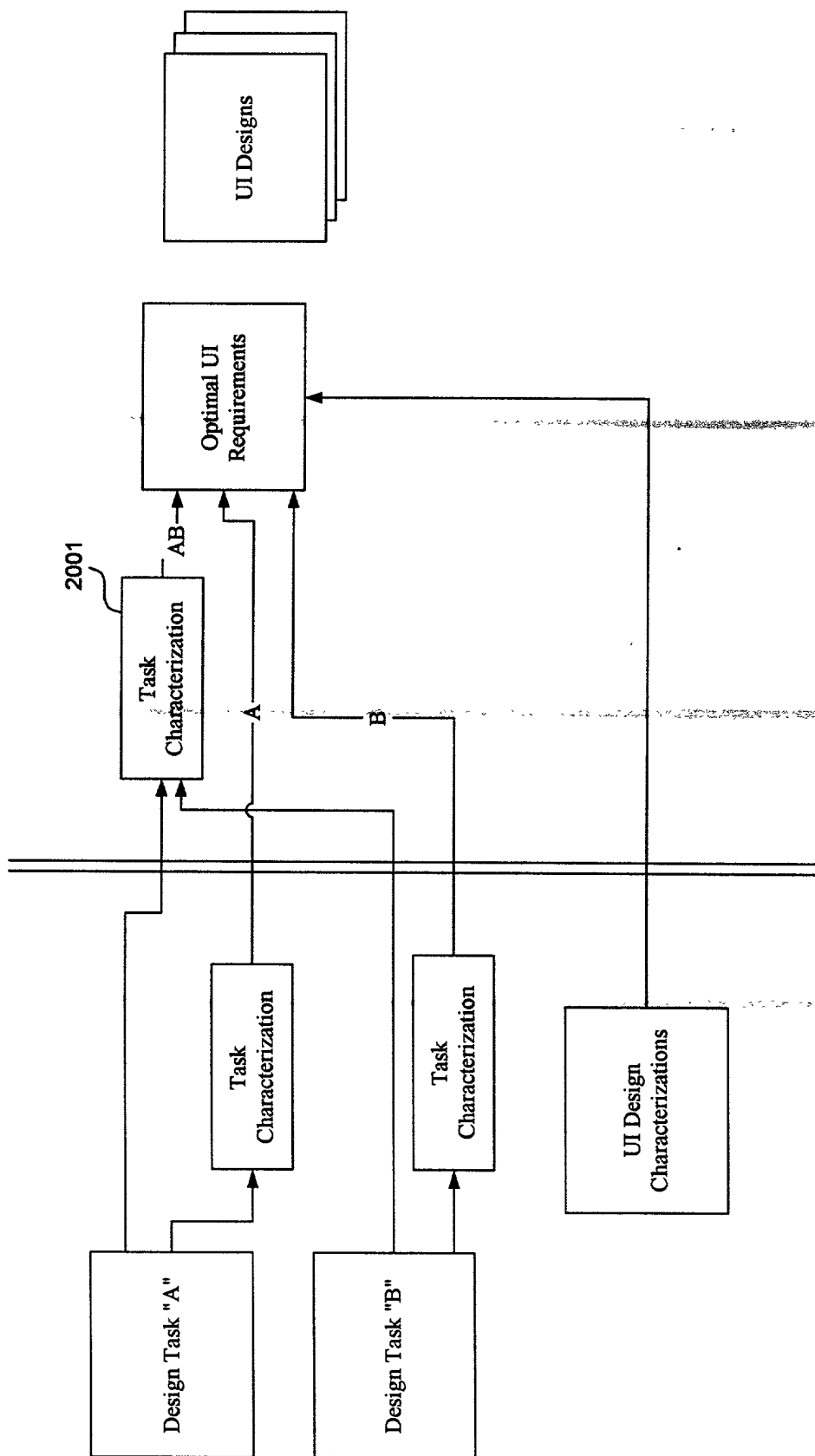
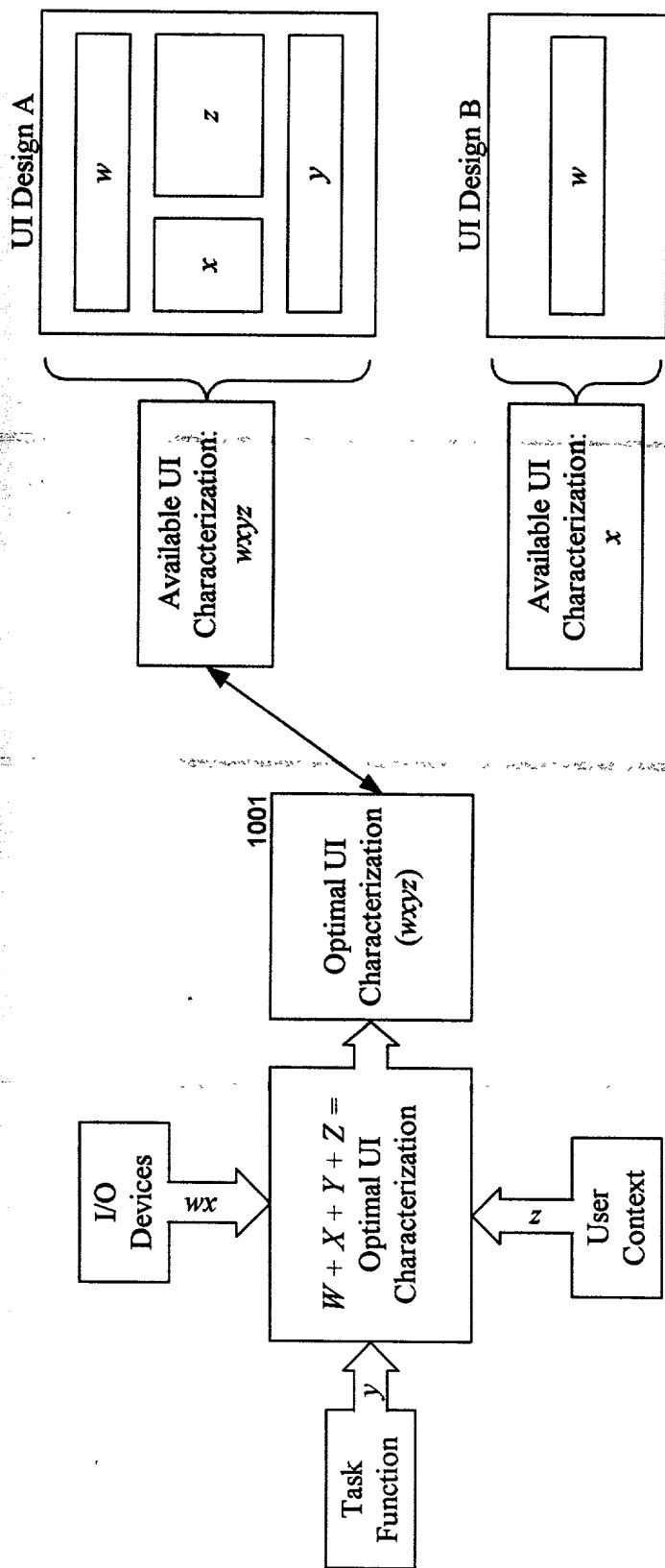


Fig. 5



**Fig. 6**

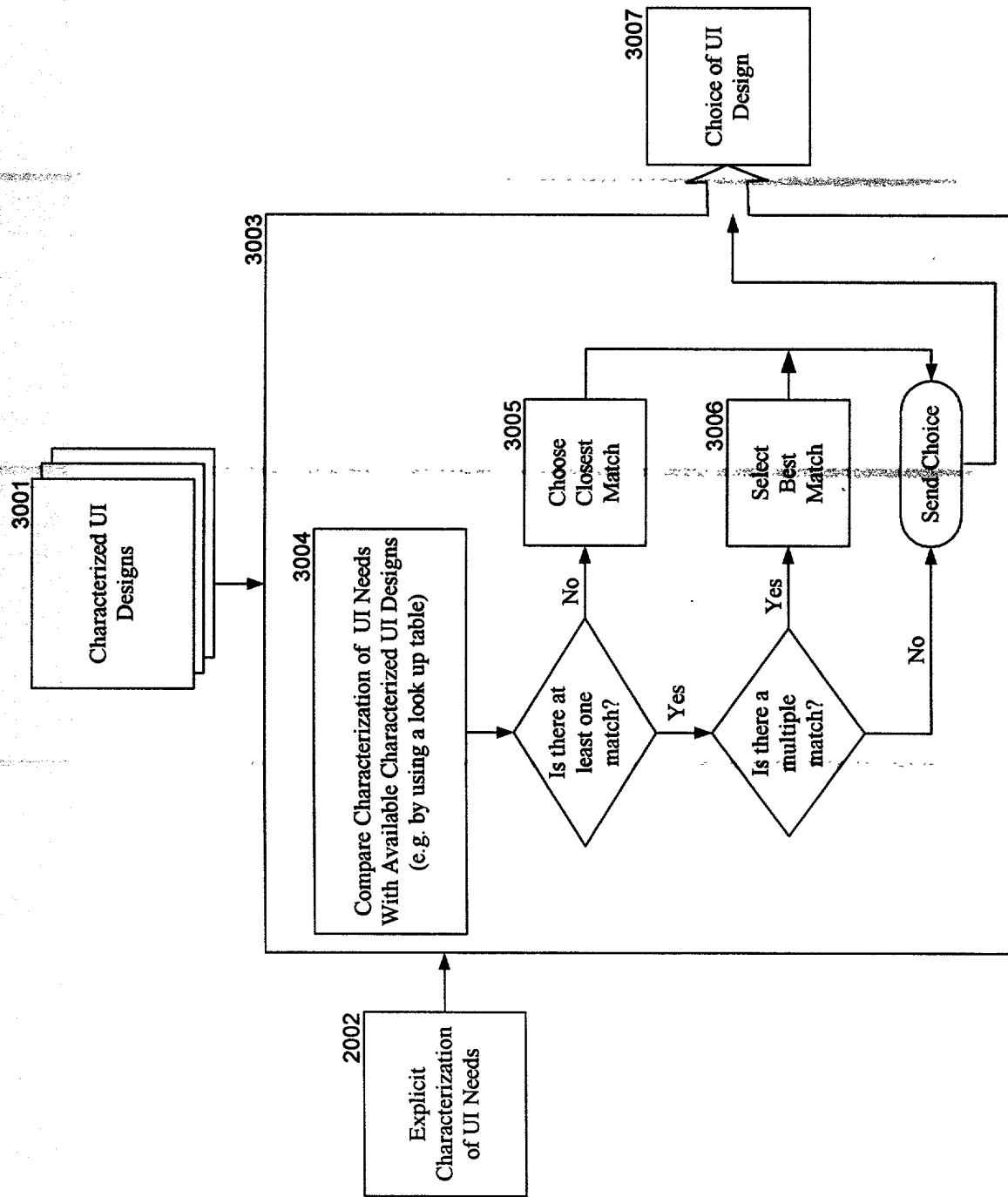


Fig. 7

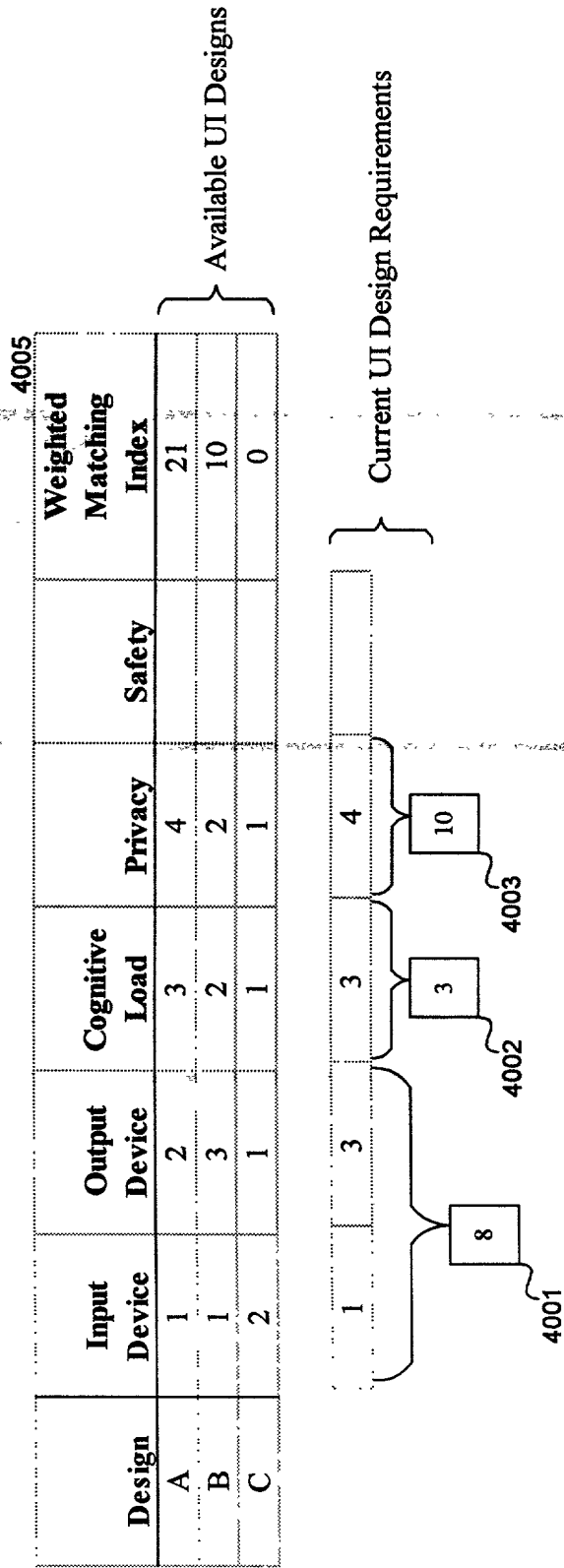
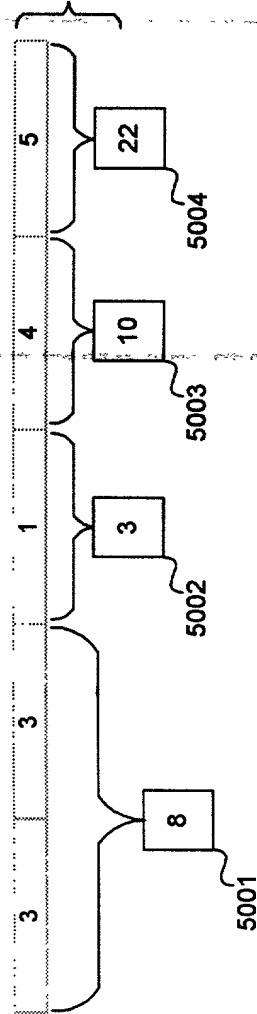
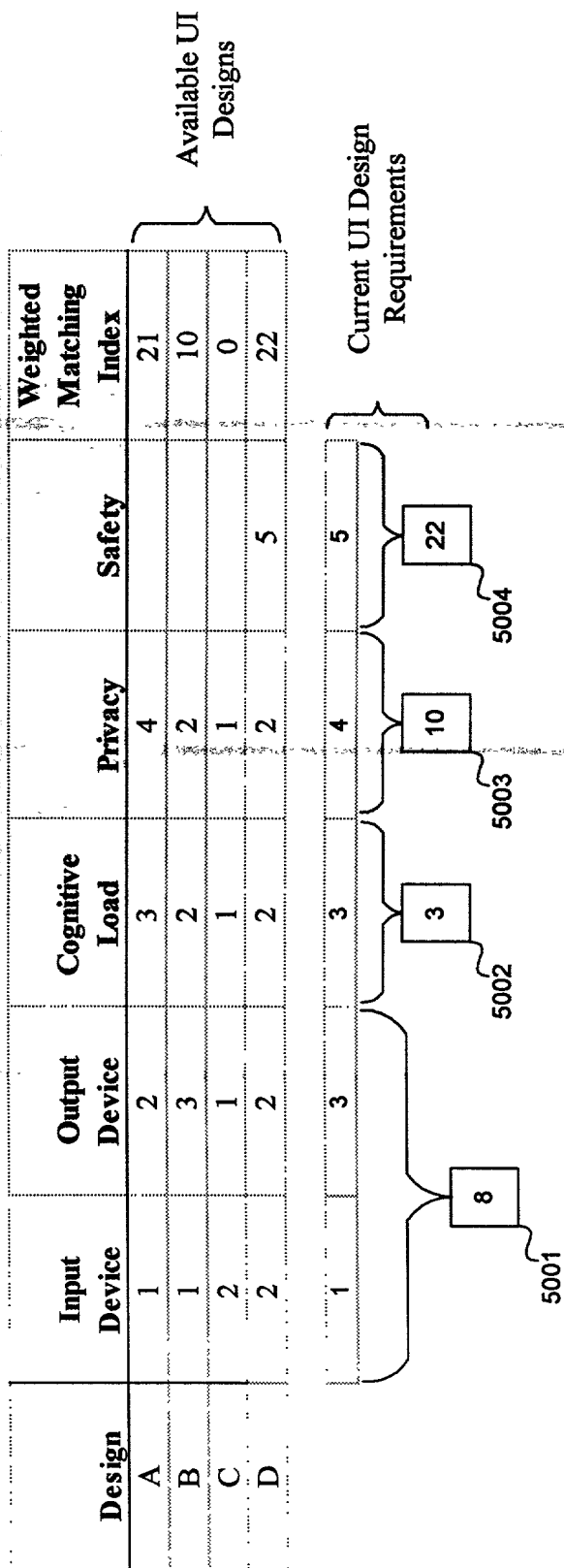


Fig. 8

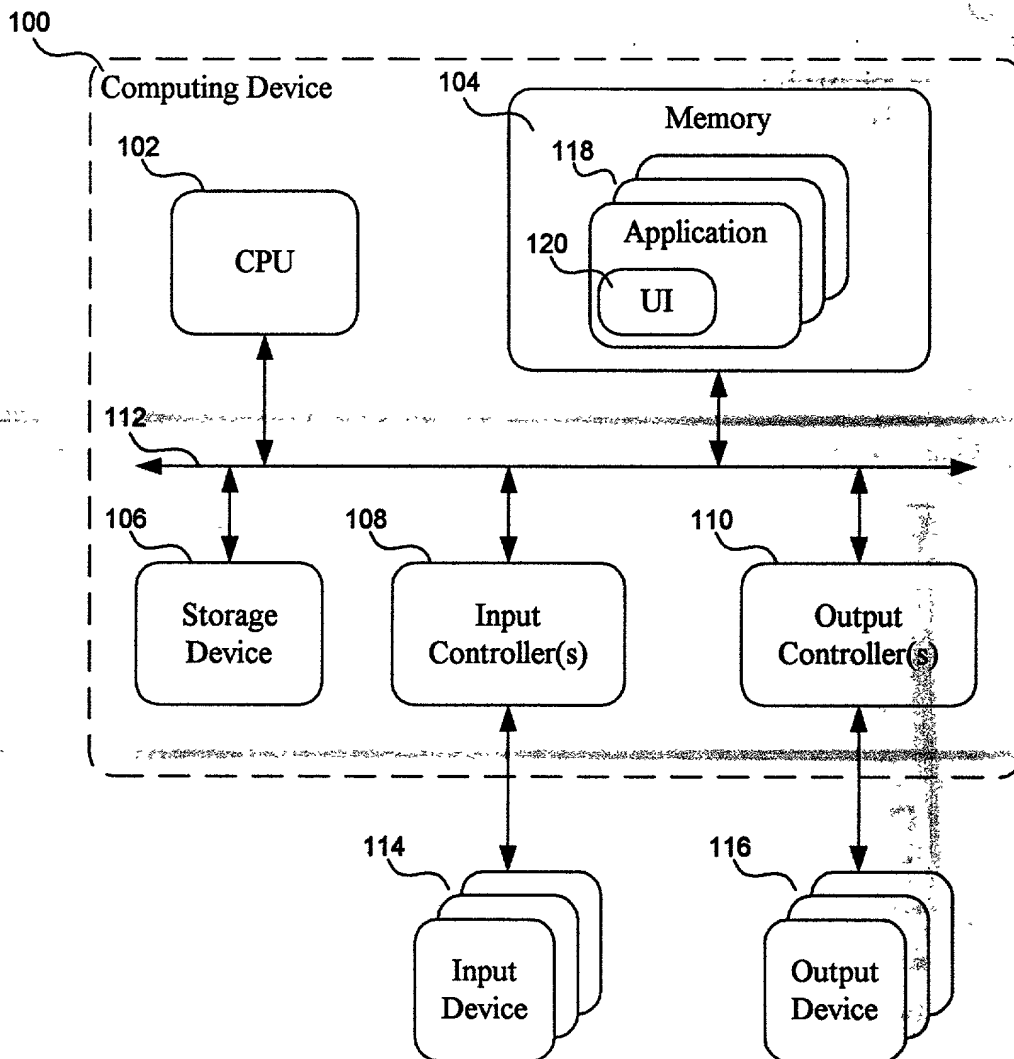
## Current UI Design Requirements



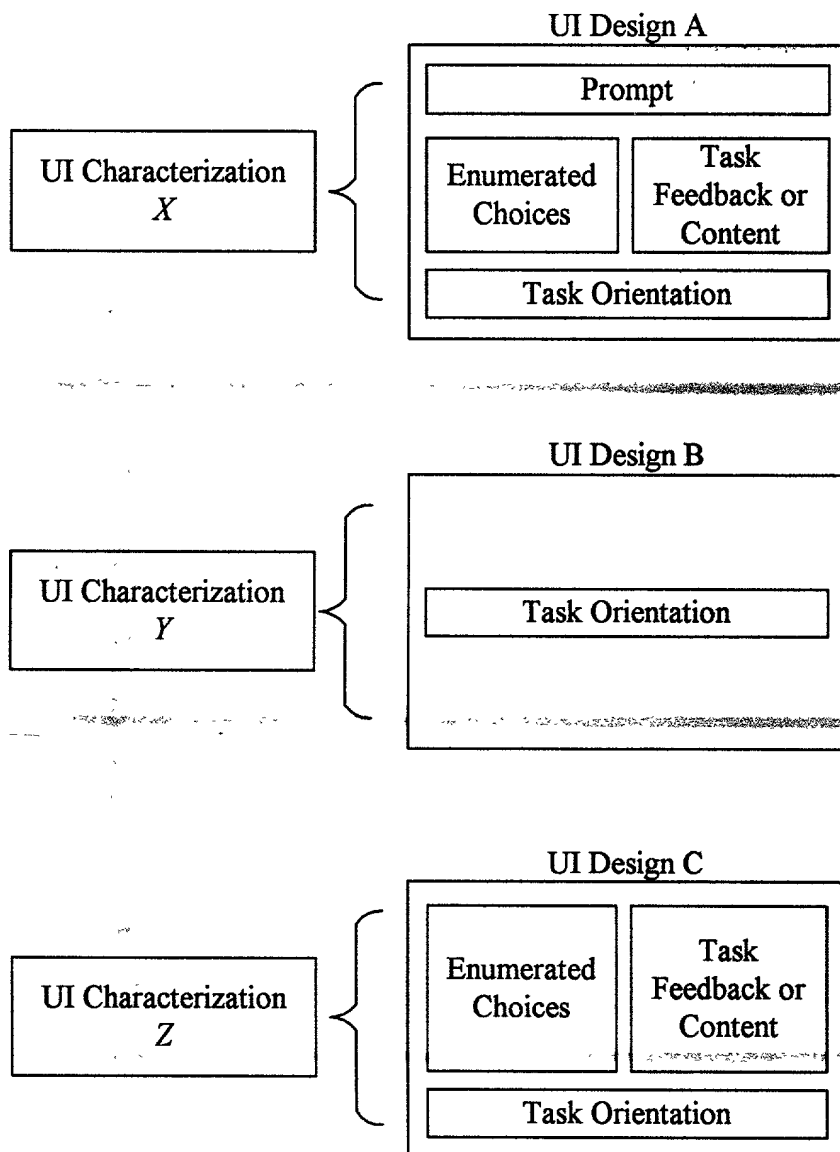
**Fig. 9**



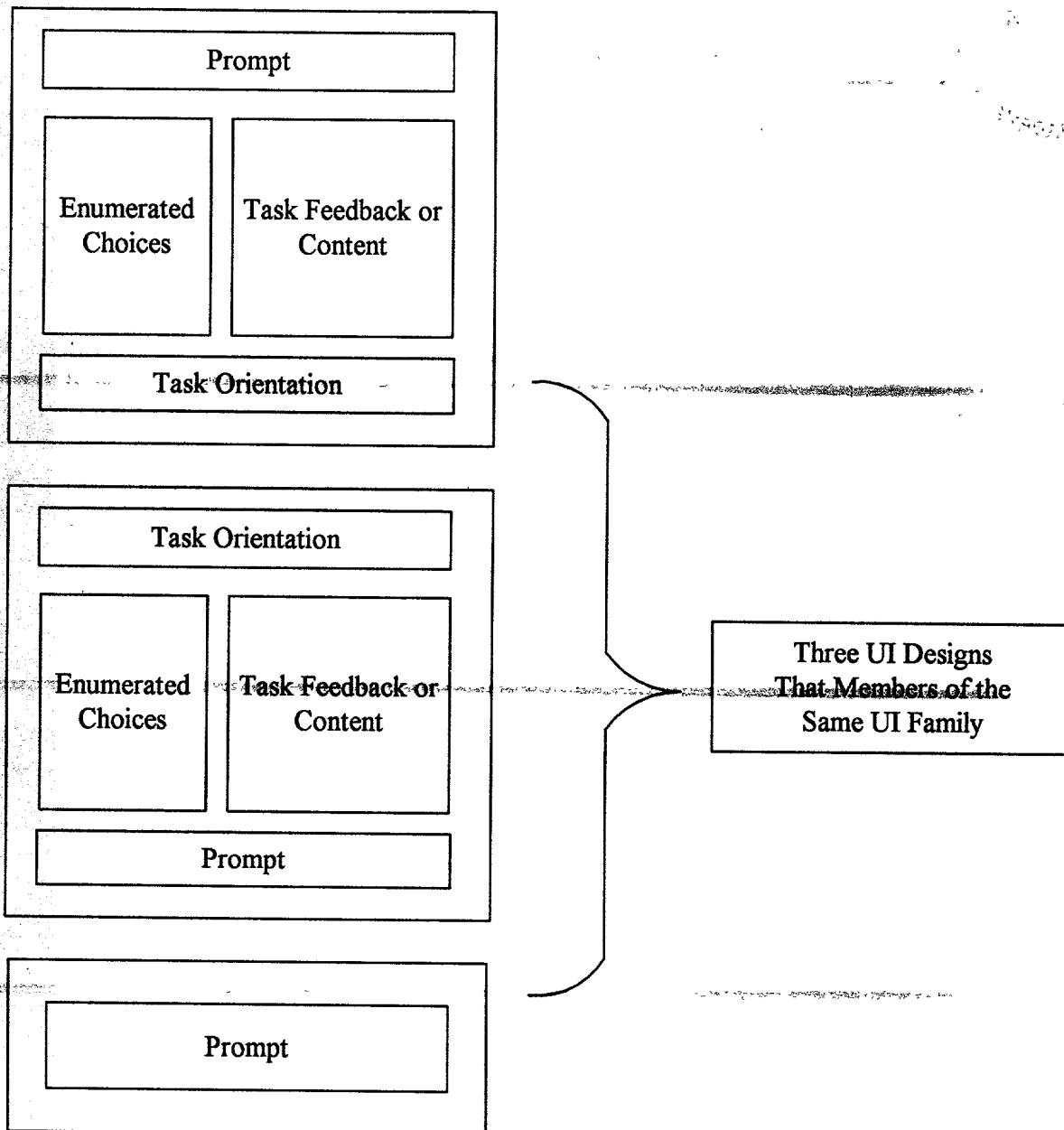
**Fig. 10**



**Fig. 11**



**Fig. 12**



**Fig. 13**

## Basic Structure

General UI assumption.  
So long as something is  
specified by the Applet, it's  
presented by the UIF.

### PROMPT(S)

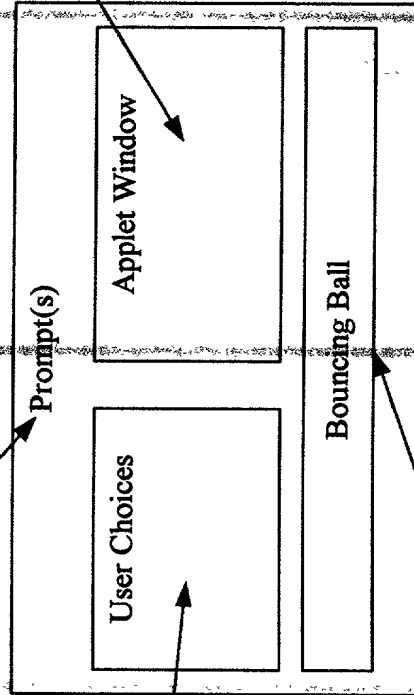
Purpose. The goal plus task. Provide minimal user guidance  
about what to do next at each step (state) of the Applet. Can  
be audio, video, LCD, etc.

Format. Under UIF's sole control for look, feel, and  
interaction. Content of the prompt(s) is provided by the  
Applet. How the prompt is presented (what combo at audio,  
video, LCD, etc) is ultimately derived from the CM.

### USER CHOICES

Purpose. Provide options for user to choose  
from to complete each step (state) of the  
Applet.

Format. Under UIF's sole control for look,  
feel, and interaction. Choices in the list are  
received from the Applet. How the choices  
are presented (e.g., verbally, visually, etc.) is  
ultimately derived from the CM.



### APPLET WINDOW

Purpose. To clarify or amplify the  
meaning of a choice or state.

Format. Currently specified by Applet  
for control for look, feel, and content;  
ultimately to be under UIF's sole  
control for look, feel, and content as  
specified by Applet.

### BOUNCING BALL

Purpose. Present all states (steps) of an Applet at once as a  
"cheat sheet" of what to do or expect next. For those familiar  
with the Applet, the bouncing ball guides the user through the  
Applet at a very high level, with a minimum of prompting.

Format. Under UIF's sole control for look, feel, and interaction.  
Content of the state label(s) is provided by the Applet. How the  
states are presented is ultimately derived from the CM.

Key	
UIF	User Interface Framework
CM	Characterization Module
Applet	Any software developed to run within the Tangis (Product) environment

**Fig. 14**